Remarks

Claims 1-15 and 24-27 are pending. With this Response, claims 10 and 24 are amended, and new claims 30 and 31 are added. Upon entry of the current amendments, claims 1-15, 24-27, 30, and 31, are pending.

Applicants submit that the claim amendments are fully supported by the application as originally filed and do not present new matter.

Claim 10 is amended to correct an obvious misspelling of the term "disperse" to "dispense." The amendment to claim 24 and new claims 30 and 31 are discussed below.

Applicants respectfully request reconsideration and further examination of the application in view of the amendments above and remarks below.

Claim Rejections - 35 U.S.C. §102

Claims 1-8 and 24-27 stand rejected under 35 U.S.C. §102 (e) as being anticipated by Mekias (U.S. Pub. No. 2003/0075555).

Independent claim 1 and dependent claims 2-8

Applicants respectfully traverse this rejection of claims 1-8 because Mekias does not teach the control feature recited in claim 1.

Claim 1 recites a spin-coating system having, *inter alia*, "a pressure sensor that measures pressure of the process solution in the dispense line at a time related to a step of dispensing the process solution, to control timing of a subsequent spin-coating process step." An example of such a time related to a step of dispensing a process solution includes the end of dispensing a photoresist solution (see the specification at, e.g., page 29, lines 1-25). And an example of a subsequent spin-coating process step, the timing of which can be controlled using such a pressure measurement from the pressure sensor includes, e.g., moving a dispenser and/or changing the turntable spin speed (e.g., changing the spin speed to casting speed) (see the specification at, e.g., page 30, lines 25-31).

Mekias does not teach or even remotely disclose a spin-coating system that includes a pressure sensor that measures the pressure of a process solution in a dispense

line at time related to solution dispense to control the timing of a subsequent spin-coating process step. Mekias relates to a particular high precision pump for dispensing fluids (see Mekias at paragraph 0005). Mekias generally discloses pressure sensors and that such pressure sensors can measure the pressure of a process fluid to control the process fluid pressure in the Mekias pump via feedback control (see Mekias at paragraph 0023). Such feedback control generally involves measuring the pressure of the process fluid, comparing that measured pressure value to a set-point pressure value and, based on the measured pressure value, may or may not also involve making adjustments to reach the set-point pressure value. However, the pressure sensors generally disclosed by Mekias do not necessarily measure the pressure of a process fluid in a dispense line at time related to solution dispense to control the timing of a subsequent spin-coating process step (e.g., moving a dispenser and/or changing the turntable spin speed).

Dependent claim 3

Dependent claim 3 is additionally discussed with respect to specific assertions made in the Office Action with respect to this claim. Claim 3 depends from base claim 1 and indicates that particular components are in a particular order. More specifically, claim 3 recites "a dispense valve between the supply of process solution and the dispenser, and the pressure sensor is between the dispense valve and the dispenser." An example of such an arrangement can be seen in, e.g., Figure 1 of the present application. Figure 1 shows dispense valve 216 between supply of process solution 214 and dispenser 206, and pressure sensor 218 between dispense valve 216 and dispenser 206 (see the specification at, e.g., page 24, lines 19-28). Figure 1 does not specifically illustrate a pump (e.g., such as the Mekias pump) for pumping the process solution, but the specification indicates that a pump would typically be located, if used, upstream from valve 216 (see the specification at, e.g., page 24, line 29 to page 25, line 2).

According to the Office Action, Mekias teaches an arrangement according to claim 3 because Figure 3 of Mekias shows a dispense valve 22 between a supply of process fluid and a dispenser 30, and a pressure sensor 44 between a dispense valve 22 and a dispenser 30.

Applicants respectfully submit that reference character 30 in Mekias is not a dispenser according to claim 3 and reference character 44 is not necessarily a pressure sensor between a dispense valve and a dispenser according to claim 3.

Reference character 30 in Figure 2 of Mekias is not a dispenser according to claim 3, e.g., such as dispenser 206 in Figure 1 of the present application. Instead, Mekias indicates that 30 is a cross section of a Mekias dispensing apparatus (i.e., pump) (see Mekias at paragraph 0033). Cross section 30 shows multiple process chambers 8, or tubes, for dispensing process fluid (see Mekias at paragraph 0033). Cross section 30 also includes a control chamber 4 for containing a control fluid that can change the volume of each process chamber (see Mekias at paragraph 0034).

Reference character 44 in Figure 3 of Mekias is not necessarily a pressure sensor between a dispense valve and a dispenser according to claim 3, e.g., such as pressure sensor 218 between dispense valve 216 and dispenser 206 in Figure 1 of the present application. Instead, Mekias merely indicates that the control fluid 20, not a process fluid, for control chamber 4 is supplied from reservoir 40 and has its pressure controlled by regulated pressure 44 (see Mekias at paragraph 0035).

Dependent claim 4

Dependent claim 4 is additionally discussed with respect to specific assertions made in the Office Action with respect to this claim. Claim 4 depends from base claim 1 and specifically recites that "the pressure sensor detects a beginning or end of process solution being dispensed from the dispenser."

According to the Office Action, Mekias teaches the subject matter of claim 4 because regulated pressure 44 inherently detects a beginning or end of process solution dispense.

Applicants respectfully submit that regulated pressure 44 of the Mekias pump does not necessarily detect a beginning or end of a process solution being dispensed from a dispenser.

As similarly discussed above with respect to claim 3, Mekias indicates that regulated pressure 44 controls the fluid pressure in control chamber 4 in the Mekias

pump. There is no indication or reason to conclude that regulated pressure 44 of the Mekias pump would necessarily (i.e., inherently) detect a beginning or an end of the dispensing of a process fluid from a dispenser.

Independent claim 24 and dependent claims 25-27

Applicants respectfully submit that the amendment to independent claim 24 renders this rejection of claims 24-27 moot.

Independent claim 24 recites a spin-coating system that features, *inter alia,* a pressure sensor that can detect a malfunction in the apparatus. As amended, claim 24 specifically recites that the pressure sensor "measures pressure of the process solution and compares the measured pressure to an expected pressure to identify a difference between the measured pressure and the expected pressure to detect a malfunction in the apparatus." (Underlining indicates amended portion of claim 24). Support for this amendment can be found in the specification at, e.g., page 14, lines 25-27.

Mekias does not teach a pressure sensor that can detect a malfunction of an apparatus, especially a pressure sensor that measures and compares the measured pressure of a process solution to an expected pressure value to detect a malfunction as now claimed. Mekias generally discloses that pressure sensors can be used in his pump to "allow for variability"/"eliminate certain variabilities" in his pump using feedback control (see Mekias at paragraph 0023). However, a pressure sensor that can allow for/eliminate variabilities via feedback control does not necessarily indicate that a malfunction exists. In other words, the Mekias pressure sensor could merely control pressure to a set point value via feedback control without ever measuring and comparing a measured pressure value to an expected pressure to identify a difference between the two values to detect a malfunction, as claimed.

Accordingly, it is respectfully requested that the rejection of claims 1-8 and 24-27 under 35 U.S.C. §102 (e) as being anticipated by Mekias, be withdrawn.

Claim Rejections - 35 U.S.C. §103

Claims 9-15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over DeSimone et al. (U.S. Pat. No. 6,383,289) in view of Hayes et al. (U.S. Pat. No. 6,494,953).

Independent claim 9 and dependent claims 10-15

Applicants respectfully traverse the rejection of claim 9-15 because the DeSimone et al. and Hayes et al. references, alone or in combination, do not teach, motivate, or suggest, the control feature of independent claim 9.

Independent claim 9 recites a spin-coating system that features, *inter alia*, "a process control system that controls application of the process solution to the substrate, the process control system being programmed to interrupt serial control to execute a process command." (Underlining added for emphasis).

The control feature of claim 9 is patentably significant because interrupting serial process control to execute a spin-coating process command can reduce or eliminate variations in timing associated with serial process control (see the specification at, e.g., page 5, lines 5-15). Serial process control can introduce timing variations because process parameters are addressed sequentially through a series of subroutines in a predetermined, fixed fashion (see the specification at, e.g., page 6, lines 24-26). For example, serial process control may be addressing other subroutines when solution dispense ends and, therefore, does not execute a process command subsequent to dispense (e.g. change turntable spin speed) until the other subroutines have been addressed (see the specification at, e.g., page 7, lines 7-22). Such variation in timing of process commands using serial process control can cause significant variations in, e.g., thickness and uniformity of process solution coating, and line-width repeatability (see the specification at, e.g., page 7, line 23 to page 8, line 3).

DeSimone et al. do not teach or even remotely disclose a process control system that controls application of a process solution and includes interrupting serial control to execute a process command. DeSimone et al. do not even disclose controlling application of a process solution with serial process control. DeSimone et al. disclose

that the carbon dioxide liquid is in fluid communication with dispenser 17 and is merely "under control of valve 32." (See DeSimone et al. at col. 3, lines 13-18, and col. 5, lines 9-20). DeSimone et al. also indicate that the shape or rate of carbon dioxide liquid can be controlled by modifying nozzle 19 (see DeSimone et al. at col. 3, lines 41-58).

According to the Office Action, DeSimone et al. teach the control feature of claim 9 at column 6, lines 24 and 25 (see the Office Action at page 4, paragraph 4).

However, Applicants respectfully submit that the Office Action misconstrues the DeSimone et al. reference with respect to the control feature of claim 9. The portion of DeSimone et al. referred to in the Office Action discloses:

> The fluid barricade, robotic arm, grasping member, and shuttle cars may be driven by standard drive techniques and the operation thereof coordinated with a controller, such as a programmable computer, in accordance with standard techniques. (See DeSimone et al. at col. 6, lines 21-26).

Contrary to the position of the Office Action, the above passage of DeSimone et al. mentions nothing about controlling application of carbon dioxide liquid or any other process solution. The above passage in DeSimone et al. discusses how the "fluid barricade, robotic arm, grasping member, and shuttle cars" can be controlled. Moreover, DeSimone et al. merely makes a general reference to standard control techniques using a computer. DeSimone et al. do not even remotely mention a process control system that includes interrupting serial process control to execute a process command, especially with respect to controlling the application of a process solution.

In addition, DeSimone et al. fail to suggest or motivate the control feature of claim 9. Indeed, the lack of disclosure by DeSimone et al. with respect to controlling the application of a process solution with even serial process control (discussed above) is hardly a motivation or suggestion to arrive at the control feature of claim 9.

The secondary reference, Hayes et al., fails to cure the deficiencies of the DeSimone et al. reference. That is, Hayes et al. fail to teach, motivate, or suggest a process control system that controls application of a process solution and includes interrupting serial control to execute a process command. Hayes et al. do not even mention controlling the application of a process solution using serial process control.

Indeed, the Office Action merely relied on the Hayes et al. reference for disclosing a nozzle that was moveable between a dispense position and a non-dispense position (see the Office Action at page 4, paragraph 4).

Dependent claims 12-14

Dependent claims 12-14 are additionally discussed with respect to specific assertions made in the Office Action with respect to these claims. Dependent claims 12-14 recite similar features related to the pressure sensor sending a signal to the control system at the beginning or end of dispensing the process solution.

According to the Office Action, DeSimone et al. teach this feature common to claims 12-14 because sensor 50 in DeSimone et al. sends a signal to pressure controller 52 at the beginning or end of dispensing liquid carbon dioxide from dispenser 17.

Applicants respectfully submit that pressure sensor 50 does not measure the pressure of the carbon dioxide liquid, controller 52 does not necessarily control application of carbon dioxide liquid, and pressure sensor 50 does not necessarily send a signal at the beginning or end of dispensing carbon dioxide liquid. Instead, Mekias indicates that pressure sensor 50 senses the pressure of the atmosphere in the chamber 11 and is merely associated with controller 52 to vent the chamber as needed via valve 53 (see DeSimone et al. at col. 3, lines 24-34, and Figure 1).

Accordingly, it is respectfully requested that the rejection of claims 9-15 under 35 U.S.C. §103(a) as being unpatentable over DeSimone et al. in view of Hayes et al. be withdrawn.

Added Claims

New claims 30 and 31 are added with this Response to depend from base claim 24. Support for new claims 30 and 31 can be found in the specification as originally filed at, e.g., page 5, lines 1 and 2, and page 23, lines 3-25.

A fee of $50.00 for one (1) total claim over twenty is enclosed herewith for adding new claims 30 and 31. No other fee is believed to be due for adding claims 30 and 31. However, if any other fee(s) are due for adding claims 30 and 31, please charge

all of the appropriate fee(s) to the Kagan Binder Deposit Account No. 50-1775 and notify us of the same.

Conclusion

In view of these amendments and remarks, it is respectfully submitted that the above-identified application is in condition for allowance.

The Examiner is invited to contact the undersigned, at the Examiner's convenience, should the Examiner have any questions regarding this communication or the present patent application.

Respectfully Submitted,

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